DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
BOLLING AFB DC 20332-6188

REPLY TO AFOMS/ SGPR
ATTN OF: BROOKS AFB TEXAS 78235-5000

SUBJECT: Request for NRC Review of Radioactive Waste Disposal and Instrument Calibration Procedures

TO: USNRC, Region IV
ATTN: Mr. D. Blair Spitzberg
611 Ryan Plaza
Arlington TX 76011-4010

1. We request NRC review and approval on instrument calibration and radioactive waste procedures for the USAF Occupational and Environmental Health Laboratory (USAFOEHL). The USAFOEHL has submitted an application for a new USAF Radioactive Material (RAM) Permit which will be divorced from the current USAF RAM permit held by the USAF School of Aerospace Medicine at Brooks AFB Texas.

2. Attachment 1 are instrument calibration procedures for radiation detection instruments which are calibrated by USAFOEHL. Please note with the exception of Victoreen, all other instruments are manufactured by Ludlum Corp, which, according to our understanding from a recent telecon with NRC, has not had their procedures reviewed by NRC. USAFOEHL's calibration procedures are a combination of the manufacturer calibration procedures and ANSI guidelines. The calibration procedures employ a dual methodology of using radioactive material and electronic pulsers.

3. Attachment 2 is a method of radioactive material disposal as proposed by USAFOEHL. The request is to consider individually identifiable radioactive sources as exempt if, the material in question is less than the exempt quantity/concentration listed in 10 CFR 30 regardless of the original exempt/non exempt status of the material. For materials with no listed exempt quantity/ concentration such as source material and special nuclear material, the USAFOEHL proposes establishing 10 pCi, 10 pCi/l and 10 pCi/gm as appropriate, as the minimum threshold requiring disposal as radioactive waste.

4. Please advise us if you have any further questions regarding any of the above.

LAWRENCE DONOVAN, Major, USAF, BSC
USAF Radioisotope Committee
Office of the Surgeon General

2 Atch
1. Calibration procedures
2. RAM Disposal

DRAFT

LUDLUM MODEL 61

C H E C K L I S T

I. SAFETY

A. All personnel operating the equipment involved in the calibration of these meters will have been briefed on safety procedures as outlined in RZD Operating Instruction (OI) 127-01.

B. For quick reference, personnel will have a copy of the RZD Radiation Safety Checklist available during operations.

II. SET-UP PROCEDURE

A. Inspection

1. Check instrument for obvious physical damage.

2. Check desiccant cartridge. It should be blue. If the cartridge is pink, replace it.

NOTE: THE INSTRUMENT SHOULD NOT BE USED OR CALIBRATION ATTEMPTED UNTIL AT LEAST TWO HOURS AFTER A FRESH CARTRIDGE IS INSTALLED.

3. Inspect mylar on detector face. It should have no tears and should lie smoothly.

B. Battery Check.

1. Turn range switch to the X1K position.

2. Depress the "BAT" button. The meter should indicate in the "BAT OK" range. If not, replace the battery, located in the front of the instrument.

3. Turn meter off.

III. CALIBRATION PROCEDURES

A. Pulse rate calibration

1. Remove the chamber from the instrument.

2. Remove the bottom plate from the instrument, taking care not to pull any wires loose.

~~Atch 2~~ Atch 1.

3. Connect pulser to instrument.

   a. Connect positive lead to the probe contact point, located at the rear of the bottom plate.

   b. Connect the negative lead to the bottom plate.

4. Turn range switch to the X1K position.

5. Set the pulser to 400K cpm (400 displayed, multiplier set to 1000).

6. Increase amplitude on the pulser until the meter responds.

7. Observe meter reading.

8. If the meter response is not within 360K and 440K cpm (+/-10%), adjust using the X1K calibration pot.

   a. The calibration pots are located on top of the instrument, beneath the "LUDLUM" plate.

9. When the proper reading has been obtained, reduce the pulser amplitude to zero.

10. Repeat steps 5 - 9, using 100K cpm. The reading should still be +/-10%. If not, adjust and go back to 400K cpm, and try to get both calibration points within tolerance. If unable to do so, refer the instrument to repair.

11. Repeat steps 4 - 10, using the remaining scales, and the corresponding pulse rates.

METER SCALE	CPM STEP 5	CPM STEP 10
X100	40000	10000
X10	4000	1000
X1	400	100

12. When finished with all scales, turn pulser amplitude down to zero.

13. Turn off meter, and disconnect pulser.

B. Detector operating point.

1. Reassemble instrument.

2. Turn range switch to X1 position.

3. Turn HV to the lowest position.

4. Slowly increase voltage until a rapid increase in count rate is experienced (without source present).

5. Check voltage by pressing "HV" button.

6. The operating voltage should be set at 150V below this breakdown point.

B. Efficiency calibration.

1. Use a 4 source calibration set, with one source for each scale.

2. Place the instrument on the source tray, perpendicular to the tray, and centered on the length of the chamber.

3. Observe and record the reading.

3. Calculate the efficiency of the detector in CPM detected/actual CPM. — DPM

C. Documentation.

1. Collect all data on the instrument, including Model, OEHL, and Serial numbers.

2. Collect the calibration data, including the graph of the response curve, information about the calibration source, and the date of calibration.

3. File all of the above information in the detector's permanent file.

4. Attach a label to the detector, containing as much calibration information as possible.

IV. POSSIBLE MALFUNCTIONS

A. Electrical shorts.

1. The Ludlum ratemeters provide voltage that can range from 400 to over 2000 volts. Shorting in these meters can cause damage to instrumentation and personal injury.

2. Do not touch the instrument if:

a. the voltmeter fluctuates without HV being adjusted.

b. arcing is seen or heard in the instrument.

c. you get a shock from the meter.

3. If a short is found, CAREFULLY turn off meter and pulser. Notify the ICF Chief immediately. Ensure that nobody else attempts to move or work on the instrument.

DRAFT

LUDLUM MODEL 19 uR METER

C H E C K L I S T

I. SAFETY

A. All personnel operating the equipment involved in the calibration of these instruments will have been briefed on safety procedures as outlined in RZD Operating Instruction (OI) 127-01.

B. For quick reference, personnel will have a copy of the RZD Radiation Safety Checklist available during operations.

II. SET-UP PROCEDURE

A. Equipment.

1. The Ludlum Model 19 is calibrated using the Shepperd Cs137 source in range #3, and a Ludlum Model 500 pulser.

2. A Fluke 8060 A Multimeter or equivalent is required for this operation.

3. A Rawson Electrical Instrument Co. electrostatic voltmeter, or equivalent, must be used to measure the HV during the calibration of these instruments.

B. Function checks.

1. Turn the function switch from "OFF" to 5000.

2. Press the "BATT" button.

a. Make sure the meter is in the "Bat test" region.

b. If the meter shows a low battery, remove batteries, and check the batteries with the voltmeter to ensure that they have less than 1.5V each. This is done to make sure the battery check is functioning correctly. If the batteries are not low, refer instrument to repair.

c. If batteries are low, replace with fresh ones, after checking with the voltmeter.

3. Turn audio switch to "ON" position.

4. Place a small radiation check source near the instrument and check for audio response and meter indication.

5. Turn instrument off.

III. CALIBRATION PROCEDURES

A. Calibration Curve

1. Remove the instrument from its case.

2. With the instrument off, remove the HV jumper at the C19-R5 junction.

3. Connect the pulser to the C19-R5 junction.

4. Set the pulse amplitude to 80 mV.

5. Turn on meter.

6. Calibrate the scales as follows:

Scale:	Reading:	CPM:
25	20	3200
50	40	6400
250	200	32000
500	400	64000
5000	4000	640000

7. Turn off meter.

8. Reconnect C19-R5 junction.

9. Place instrument back in case.

10. Place the instrument 10cm from a calibration source. Arrange the instrument and source so that the configuration will not be disturbed.

11. Turn HV down to its minimum setting, then slowly increase again until a meter response is elicited.

12. Observe and record reading.

13. Turn off meter, remove from case, disconnect C19-R5 junction, and connect voltmeter.

14. Turn meter on, and record voltage.

15. Increase voltage by 50V.

16. Turn off meter, disconnect voltmeter, reconnect C19-R5 junction, replace meter in case.

17. Take a reading with instrument in place as in step #10.

18. Repeat steps 12-17, until a reading is reached which is twice the previous reading.

Example:

HV	µR/hr
850	140
900	180
950	420

In this case, you would stop at 950 V.

19. Using the high voltage as X values and the µR/hr readings as Y values, plot the response curve (see Fig. 1). A plateau should be apparent. The proper operating voltage for the probe is approximately one-third of the way along this plateau.

B. Exposure Rate

1. The Ludlum Model 19 has five overlapping ranges, and each must be calibrated. The sensitivity of the instrument requires that the two lower scales are calibrated using the pulser. The top three ranges, however are calibrated using the Cs137 source.

2. Cs 137 calibration

a. The following table gives the respective ranges, and the two exposure rates at which each must be calibrated.

RANGE	CALIBRATION POINT #1	CALIBRATION POINT #2
0-250 µR/hr	200 µR/hr	50 µR/hr

0-500 µR/hr	400 µR/hr	100 µR/hr
0-5000 µR/hr	4000 µR/hr	1000 µR/hr

b. Set the Model 19 to the 0-5000 µR/hr range.

c. Expose the instrument to 4000 µR/hr and observe the meter response. The reading should be ±10% of the actual rate (or between 3600 and 4400 µR/hr).

d. If the reading is outside of these parameters, adjust the calibration potentiometer for the range being calibrated.

i. Adjust the calibration pot appropriately. Clockwise movement will increase the meter response. Counterclockwise will decrease it.

ii. Adjust the pot in small increments until the correct reading is achieved. If the correct reading cannot be reached, refer the instrument to repair.

e. Once the proper reading is reached, repeat steps c. and d., using the second calibration point (1000 µR/hr).

f. If the 1000 µR/hr reading is ±10%, the calibration of the 0-5000 µR/hr range is complete. If not, readjust the calibration pot until both points yield readings which are within the ±10% tolerance. If this cannot be done, refer the instrument to repair.

g. After adjusting the 0-5000 µR/hr range, repeat steps b-f for the 0-500 and 0-250 µR/hr ranges.

3. Pulser calibration.

a. Connect the pulser to the instrument (as in III. A.), and set instrument to the 0-250 µR/hr range.

b. Adjust the pulse rate until a reading of 200 µR/hr is reached.

c. Calculate the new ratio of CPM/(µR/hr):

Example:

CPM μR/hr

28000 200

$$\frac{28000}{200} = 140 \text{ CPM}/(\mu\text{R/hr})$$

d. Calculate the CPM required to achieve 40 and 20 μR/hr respectively.

Example: (cont.)

[140 CPM/(μR/hr)] X (40 μR/hr) = 5600 CPM

[140 CPM/(μR/hr)] X (20 μR/hr) = 2800 CPM

e. Set pulser to CPM calculated for 40 μR/hr.

f. Set the meter to the 0-50 μR/hr range.

g. Adjust calibration pot for the appropriate range until the meter reads 40 μR/hr.

h. Repeat process with 0-25 μR/hr range, and the values for 20 μR/hr.

C. Documentation.

1. Collect all data on the instrument, including Model, OEHL, and Serial numbers.

2. Collect the calibration data, including which ranges were calibrated with the Cs137 source, which were calibrated using the pulser, and the date of calibration.

3. File all of the above information in the instrument's permanent file.

4. Attach a calibration label to the instrument, containing as much calibration information as possible.

IV. POSSIBLE MALFUNCTIONS

DRAFT

VICTOREEN 470A

C H E C K L I S T

I. SAFETY

A. All personnel operating the equipment involved in the calibration of these instruments will have been briefed on safety procedures as outlined in RZD Operating Instruction (OI) 127-01.

B. For quick reference, personnel will have a copy of the RZD Radiation Safety Checklist available during operations.

II. SET-UP PROCEDURE

A. Equipment.

1. The Victoreen 470 Survey Meter is calibrated using the Shepperd Cs137 source in range #3.

2. A Fluke 8060 A Multimeter or equivalent is required for this operation.

B. Function checks.

1. Turn the Range Switch from "OFF" to "BATT".

2. Make sure the meter is in the "BATT OK" green region.

a. If the meter shows a low battery, take out batteries by removing the retaining plug on the bottom end of the instrument handle.

b. Check the batteries with the voltmeter to ensure that they have less than 1.5V each. This is done to make sure the battery check is functioning correctly. If the batteries are not low, refer instrument to repair.

c. If batteries are low, replace with fresh ones, after checking with the voltmeter.

3. Turn the Range Switch to "1000".

4. Push the "Zero Set" button and set "Zero Adjust" so that the meter reads zero.

5. Turn the Function Switch to "mR/hr".

NOTE: AS THE ION CHAMBER HIGH VOLTAGE RISES TO -90 VOLTS, THE INSTRUMENT WILL READ UPSCALE. THIS LASTS FOR LESS THAN ONE MINUTE AFTER THE INSTRUMENT IS TURNED ON.

6. After one minute, turn the Range Switch to "3 mR/hr". The instrument should now read background radiation.

7. Remove VICTOREEN logo, located just behind the instrument display.

8. Press the button, located on the left side of the opening. This is the battery check for the the high voltage supply. Once again, make sure the meter reads in the green region.

a. If this battery check indicates low voltage, the internal batteries need to be replaced. This procedure requires invasive procedures, and should only be accomplished by the repair technician.

9. Replace the logo.

10. Place a small radiation source near the 470A so the meter reads about 1 mR/hr.

11. Turn the range Switch to the 10 mR/hr and to the 30 mR/hr range. The meter should decrease on each range change to always indicate about 1 mR/hr.

NOTE: THE OPERATIONAL CHECK SOURCE ON THE END CAP OF THE CHAMBER EQUILIBRIUM SLEEVE MAY BE USED FOR THIS TEST. THE CHECK SOURCE WILL PRODUCE A READING OF GREATER THAN 1 mR/hr WHEN PLACE ON TOP OF OR IN FRONT OF THE BARE CHAMBER.

III. CALIBRATION PROCEDURES

A. Exposure Rate

1. The Victoreen 470A has twelve overlapping ranges, and each must be calibrated. The following table gives the respective ranges, and the two exposure rates at which each must be calibrated.

RANGE	CALIBRATION POINT #1	CALIBRATION POINT #2
0-3 mR/hr	2.5 mR/hr	0.5 mR/hr

0-10 mR/hr	8 mR/hr	2 mR/hr
0-30 mR/hr	25 mR/hr	5 mR/hr
0-100 mR/hr	80 mR/hr	20 mR/hr
0-300 mR/hr	250 mR/hr	50 mR/hr
0-1000 mR/hr	800 mR/hr	200 mR/hr
0-3 R/hr	2.5 R/hr	0.5 R/hr
0-10 R/hr	8 R/hr	2 R/hr
0-30 R/hr	25 R/hr	5 R/hr
0-100 R/hr	N/A	20 R/hr
0-300 R/hr	N/A	N/A
0-1000 R/hr	N/A	N/A

NOTE: N/A indicates exposure rates which are too high for the Shepperd Cs137 unit.

2. Set the 470A to the 0-300 mR/hr range.

3. Expose the instrument to 250 mR/hr and observe the meter response. The reading should be ±10% of the actual rate (or between 225 and 275 mR/hr).

4. If the reading is outside of these parameters, adjust the calibration potentiometer.

   a. Remove the Victoreen logo.

   b. Locate the pot nearest the rear of the instrument. This is the calibration pot. The other (nearest the front of the instrument) is the gross zero adjust, and SHOULD NOT be adjusted at this time.

   c. Adjust the calibration pot appropriately. Clockwise movement will increase the meter response. Counterclockwise will decrease it.

   d. Adjust the pot in small increments until the correct reading is achieved. If a large number of rotations is required, refer the instrument to repair.

5. Once the proper reading is reached, repeat steps 2 and 3, using the second calibration point (50 mR/hr).

6. If the 50 mR/hr reading is ±10%, the calibration of the 0-300 mR/hr range is complete. If not, readjust the calibration pot until both points yield readings which are within the ±10% tolerance. If this cannot be done, refer the instrument to repair.

7. After adjusting the 0-300 mR/hr range, MAKE NO FURTHER ADJUSTMENTS. Replace the Victoreen logo.

8. Repeat the two point calibration of the remaining ranges, with no adjustments, using the exposure rates listed above. If any range gives a reading outside of ±10%, the instrument requires repair.

B. Integration.

1. Set the Function switch to "INTEGRATE", and the Range switch to 300.

2. Press the "Zero Set" button. In the integrate mode, this will reset the meter, and eliminate any previous exposure collected.

3. Expose the instrument to 250 mR. The meter should reflect a reading that is also within the ±10% tolerance.

C. Documentation.

1. Collect all data on the instrument, including Model, OEHL, and Serial numbers.

2. Collect the calibration data, including ranges not calibrated, and the date of calibration.

3. File all of the above information in the instrument's permanent file.

4. Attach a calibration label to the instrument, containing as much calibration information as possible.

IV. POSSIBLE MALFUNCTIONS

DRAFT

GEIGER-MUELLER PANCAKE PROBE

C H E C K L I S T

I. SAFETY

A. All personnel operating the equipment involved in the calibration of these probes will have been briefed on safety procedures as outlined in RZD Operating Instruction (OI) 127-01.

B. For quick reference, personnel will have a copy of the RZD Radiation Safety Checklist available during operations.

II. SET-UP PROCEDURE

A. Equipment.

1. A Ludlum Model 2500 Ratemeter-Scaler, with a current calibration is required for this calibration.

2. A source of known activity, usually a beta emitter such as Sr90 is required. When the probe will be used to detect a specific isotope, use that isotope if it is available.

3. Visually inspect the probe for obvious damage, including loose connector, damaged wire mesh face screen, and ruptured mylar window.

B. Function checks.

1. Connect probe to meter.

2. Adjust threshold level to 10 mV.

3. Turn PHA switch to "OFF".

4. Turn voltage adjust to lowest setting.

5. Turn meter on.

6. Increase the voltage until background counts are obtained. Place the probe directly on the calibration source, and observe the meter response. The count rate should be significantly higher. If not, remove probe from source, increase voltage by 100V, and try again. If there is no difference in

response before approximately 900V, refer probe to repair.

7. Once proper response is established, set voltage to level where background is initially detectable.

III. CALIBRATION PROCEDURES

A. Calibration Curve

1. Place the probe 10cm from the calibration source. Arrange the probe and source so that the configuration will not be disturbed.

2. Set the Model 2500 timer to 1 minute.

3. Depress the "COUNT RESET" button.

4. The meter will count for one minute. At the end of this time, observe and record both the high voltage and the number of counts.

5. Increase the high voltage by 50V.

6. Repeat steps 3-5 until the number of counts is at least twice that of the number immediately preceding it.

Example:

HV	Counts
850	14832
900	18776
950	42953

In this case, you would stop at 950 V.

7. Using the high voltage as X values and the counts as Y values, plot the response curve (see Fig. 1). A plateau should be apparent. The proper operating voltage for the probe is approximately one-third of the way along this plateau.

B. Efficiency calibration.

1. With the Model 2500 set at the voltage determined in the preceding step, take a one minute measurement with the detector in the same configuration as for calibration curve determination.

2. PHA window adjustment (see II. A. 7. above):

a. Set Model 18 or 2220 to PHA.

b. Set pulser to desired window setting.

c. Adjust pot marked "W" (on 2220, pot labeled "WINDOW") until the meter gives an intermittent response.

d. Move the fine amplitude adjustment back and forth a few times, to ensure that the PHA mode is working, and the window is set correctly.

C. High Voltage Adjustment.

1. Observe the reading on the voltmeter, located on the lower left portion of the pulser.

2. Adjust the HV pot corresponding to the HV channel being used, until the voltmeter gives a reading of approximately 500V.

3. Repeat this process for all three HV channels on the 16(P) and 18.

IV. POSSIBLE MALFUNCTIONS

A. Electrical shorts.

1. The Ludlum ratemeters provide voltage that can range from 400 to over 2000 volts. Shorting in these meters can cause damage to instrumentation and personal injury.

2. Do not touch the instrument if:

a. the voltmeter fluctuates without HV being adjusted.

b. arcing is seen or heard in the instrument.

c. you get a shock from the meter.

3. If a short is found, CAREFULLY turn off meter and pulser. Notify the ICF Chief immediately. Ensure that nobody else attempts to move or work on the instrument.

440K cpm (+/-10%), adjust using the X1000 calibration pot.

a. Model 16(P) and 18: Calibration pots are located on top of the instrument.

b. Model 2220: Pots are located inside the meter. If adjustment is necessary, the meter should be shut off, and the meter opened to access the pots. Calibration can then continue, but extreme care must be exercised to avoid electrical shock, or damage to the instrument.

6. When the proper reading has been obtained, reduce the pulser amplitude to zero.

7. Repeat steps 2 - 4, using 100K cpm. The reading should still be +/-10%. If not, adjust and go back to 400K cpm, and try to get both calibration points within tolerance. If unable to do so, refer the instrument to repair.

8. Repeat steps 1 - 7, using the remaining scales, and the corresponding pulse rates.

METER SCALE	CPM STEP 2	CPM STEP 7
X100	40000	10000
X10	4000	1000
X1	400	100

9. The Model 2220 has a logarithmic scale, in addition to the four linear scales. The log scale should be calibrated using 400K, 40K, 4K, and 400 CPM.

10. When finished with all scales, turn pulser amplitude down to zero.

B. Energy discrimination

1. Increase amplitude, slowly this time, until an intermittent response is elicited from the meter. This is the threshold.

a. On Models 16(P) and 18, the threshold is not adjustable.

b. The 2220 has threshold adjustment capability.

2. Observe and record the one-minute reading.

3. Calculate the efficiency of the detector in either CPM/DPM or CPM/μCi, depending on the units given by the source.

C. Documentation.

1. Collect all data on the instrument, including Model, OEHL, and Serial numbers.

2. Collect the calibration data, including the graph of the response curve, information about the calibration source, and the date of calibration.

3. File all of the above information in the detector's permanent file.

4. Attach a label to the detector, containing as much calibration information as possible.

IV. POSSIBLE MALFUNCTIONS

DRAFT

LUDLUM MODELS 16(P), 18, AND 2220

C H E C K L I S T

I. SAFETY

A. All personnel operating the equipment involved in the calibration of these ratemeters will have been briefed on safety procedures as outlined in RZD Operating Instruction (OI) 127-01.

B. For quick reference, personnel will have a copy of the RZD Radiation Safety Checklist available during operations.

II. SET-UP PROCEDURE

A. Battery Check.

1. Remove "D" batteries from the meter.

2. Check the voltage using a Hewlett-Packard Model 3476B Multimeter or similar voltmeter.

3. Each battery should have a charge of at least 1.5V. If charge is less than 1.5V, replace.

4. Check batteries for leaks or other damage before putting them in the meter.

5. Once batteries are replaced, use the meter's battery check function. Make sure that it indicates adequate charge. If it does not, and the batteries have been checked using a voltmeter, refer the instrument to repair.

6. Turn meter off.

7. ********** IMPORTANT **********
It should be decided by this time whether the Model 16(P) will be used in the PHA or open mode. Before going any further, open the case and inspect the switch located inside the meter. Make sure it is set as desired. Also, the fast-slow response switch is located here. These controls on the Models 18 and 2220 are located on the instrument exterior, and can be set at any time.

DO NOT OPEN CASE WHILE METER IS ON!

B. Function checks.

1. Connect pulser to meter.

2. Turn on pulser.

3. Set pulser to 400 counts per minute (400 on the digital display, multiplier set to 1).

4. Set amplitude control to 50 mV and ensure that the fine adjustment is turned fully counterclockwise.

5. Turn meter on. Set range to the X1 scale. Turn audio switch to the on position.

6. Increase the fine amplitude until an audible response is heard, and the needle responds. If either does not occur, refer instrument to repair.

7. Turn audio switch off.

8. The Model 2220 has some features which are different from the 16(P) and 18. These features do not affect the calibration process, but should be checked for proper functioning at this time.

   a. Count button: Initiates counting in the scaler mode.

   b. Zero button: Causes the analog meter to zero.

   c. Hold button: Stops scaler counting.

   d. Light: Illuminates the digital display.

III. CALIBRATION PROCEDURES

A. Pulse rate calibration

1. Set the meter to the X1000 scale.

2. Set the pulser to 400K cpm (400 displayed, multiplier set to 1000).

3. Increase amplitude on the pulser until the meter responds.

4. Observe meter reading.

5. If the meter response is not within 360K and

6.2 Handling and disposal of small quantities/concentrations of radioactive materials

a. We propose to use the following procedures for handling and disposing of certain small quantities of radioactive materials. The rational for these procedures is that such quantities/concentrations are either below the limits exempt from the requirements for permitted materials or are "environmental" levels.

b. These procedures will apply to industrial, environmental or biological samples received at the laboratory for analysis. It applies to both the portion prepared for analysis and any material remaining from the submission. It also applies to samples and planchetts prepared as spikes or tracers for use as reference standards.

c. These procedures will apply to any sample determined to contain byproduct materials less than the exempt quantity or concentration listed in 10 CFR Part 30. It will also apply to samples determined to contain a quantity of source or special nuclear material less that 10 pCi for samples (i. e., planchets) or concentration less than 10 pCi/gm for solids or 10 pCi/ml for liquids. References to radioactive material below exempt quantity/concentration in other parts of this application should be interpreted to also include these limits for source and special nuclear material.

d. A record will be maintained of all samples received for analysis and the results of the analysis. If the analysis shows that the amount of radioactive material in the sample is less than the limits described above, the sample and the bulk of material the sample came from may be disposed of as normal waste.

e. A record will be maintained of all radioactive material used to prepare spike or tracer reference standards. If a reference standard is determined to contain less than the amount of radioactive material described above as exempt, no further accounting of the standard will be made and the standard may be disposed of as normal waste.

f. Any spike or tracer reference standard, analyzed sample, or the bulk the sample came from, determined to contain radioactive materials in excess of the limits above will be disposed of as radioactive waste.

g. A record will be maintained of all radioactive materials disposals as radioactive waste.

Atch 2

Permitting, Handling and Disposal
Exempt/Non-exempt Radioactive Materials

Definition of exempt material:

By product material	- any sources each of which do not exceed the quantity/concentration in Part 30, Schedule A/B
Source material	- any solution in which the source material is less than 0.05 percent by weight of the solution or contains less than 10 pCi or 10 pCi/liter of source material
Special nuclear	- any source containing less than 10 pCi or 10 pCi/liter of special nuclear material
Transuranics	- same as special nuclear material
Accelerator produced	- any sources each of which do not exceed 100 nCi
Naturally occurring	- any sources each of which do not exceed 100 nCi
Minimum level of detection (MLD)	- any material below the MLD will be considered as non-radioactive for purposes of disposal

How materials will be permitted/handled:

Non-exempt material	- listed on permit, maintain inventory and accountability, dispose or transfer as radioactive
Exempt material	- not included in possession limits, reason and prudence regarding transfer and disposal
Sealed source	- maintain accountability for non-exempt sources
Unsealed source	- maintain accountability for non-exempt sources
Dilutions	- maintain accountability for dilutions from non-exempt sources only if the dilution is non-exempt; if dilution is exempt, material will be considered as used in process
Spiked planchets	- maintain accountability only for spikes containing non-exempt quantity of material; if spike contains exempt quantity, material will be considered as used in process
Samples for analysis	- any sample submitted for analysis which contains only natural radioactivity (not introduced into the sample by artificial means such as a spill) will be considered as not radioactive, regardless of level of radioactivity found